PLANT PHYSIOLOGY

EDITORS

WALTER F. LOEHWING

C. H. WADLEIGH
M. W. PARKER
J. B. BIALE

H. B. VICKERY
F. P. CULLINAN
C. S. FRENCH

ROBERT M. MUIR

H. A. BORTHWICK
P. J. KRAMER
J. BONNER

K. C. HAMMER
R. EMERSON
W. E. LOOMIS

VOLUME 28

1953

THE SCIENCE PRESS
LANCASTER, PENNSYLVANIA

TABLE OF CONTENTS

NUMBER 1. JANUARY

Influence of visible and near infrared radiant energy on organ development and pigment synthesis in bean and corn. R. B. WITHROW, W. H. KLEIN, L. PRICE and V. ELSTAD 1– 14

Studies on the chemistry of the living bark of the black locust in relation to its frost hardiness. III. The validity of plasmolysis and desiccation tests for determining the frost hardiness of bark tissue ..... D. SIMINOVITCH and D. R. BRIGGS 15– 34

The sprouting of sweetgum in relation to season of cutting and carbohydrate content ..... KARL F. WENGER 35– 49

The physiological action of smog on plants. I. Initial growth and transpiration studies. HELEN GARMAN KORITZ and F. W. WENT 50– 62

Some respiratory characteristics of the blue-green alga, Anabaena. GEORGE G. WEBSTER and ALBERT W. FRENKEL 63– 69

The metabolism of foliar-applied urea. I. Relative rates of $C^{14}O_2$ production by certain vegetable plants treated with labeled urea ..... O. N. HINSVARK, S. H. WITTWER and H. B. TUKEY 70– 76

The relation of the amino acid composition to the development of oats. ..... THOMAS A. MCCOY, THOMAS H. SUBLETT and VERGIL W. DOBBS 77– 88

Electrode reactions of isolated chloroplast fragments. H. S. A. GILMOUR, RUFUS LUMRY and JOHN D. SPIKES 89– 98

Effect of inorganic ions and their conductances on geotropic curvature of the Avena coleoptile ..... A. R. SCHRANK 99–104

Filters for the isolation of narrow regions in the visible and near-visible spectrum .... ROBERT B. WITHROW and LEONARD PRICE 105–114

Phosphogluconic dehydrogenase in higher plants. ROBERT C. BARNETT, HELEN A. STAFFORD, ERIC E. CONN and BIRGIT VENNESLAND 115–122

Frenching in ragweed (*Ambrosia artemisiifolia* L.). LINUS H. JONES 123–126

Effect of stable boron isotopes on growth of tobacco in solution cultures ..... J. E. MCMURTREY, JR. and H. B. ENGLE 127–130

Low temperature inductions of flowering in a *Nicotiana rustica* × *N. tabacum* hybrid ..... ROBERT A. STEINBERG 131–134

The effect of 2,4-dichlorophenoxyacetic acid on phosphorylase, phosphatase, amylase, catalase, and peroxidase activity in wheat ..... D. J. WORT and L. M. COWIE 135–139

Optimum chloride concentration for malt diastase activity as a function of temperature ..... H. C. EYSTER 140–142

An autoradiographic technique for detailed studies with plant tissue ..... W. M. DUGGER, JR. and D. E. MORELAND 143–145

Notes 146–150

NUMBER 2. APRIL

Effect of quality and intensity of solar radiation on injury of lemon fruit by sulphur treatment in the field.
F. M. TURRELL and A. M. BOYCE 151–176

Studies on the chemistry of the living bark of the block locust tree in relation to frost hardiness. IV. Effects of ringing on translocation, protein synthesis and the development of hardiness.
D. SIMINOVITCH and D. R. BRIGGS 177–200

Floral induction and development in orchard grass.
F. P. GARDNER and W. E. LOOMIS 201–217

On the mechanism of action of growth regulators.
ROBERT M. MUIR and CORWIN HANSCH 218–232

Pyridine nucleotide-nitrate reductase from extracts of higher plants ..... HAROLD J. EVANS and ALVIN NASON 233–254

Carbohydrate metabolism in the tomato fruit as affected by pollination, fertilization and application of growth regulators.
E. MARRÈ and A. E. MURNEEK 255–266

Factors affecting cotyledonal cracking during the germination of beans (*Phaseolus vulgaris*) ..... J. P. MCCOLLUM 267–274

Accumulation and distribution of molybdenum in the cotton plant.
HOWARD E. JOHAM 275–280

The use of C^{14} in locating growth regions in the cell walls of elongating cotton fibers ..... JOSEPH C. O'KELLEY 281–286

Phosphorylase and a branching enzyme in squash.
THOMAS G. PHILLIPS and WARREN AVERILL 287–292

The effects of maleic hydrazide on flower initiation.
W. H. KLEIN and A. C. LEOPOLD 293–298

Preferential assimilation of ammonium ion by *Chlorella vulgaris*.
JOHN F. SCHULER, VIOLET M. DILLER and HAROLD J. KERSTEN 299–303

Reserve carbohydrates in orchard grass cut for hay.
J. T. SULLIVAN and V. G. SPRAGUE 304–313

The intracellular distribution of ascorbic acid in turnip leaves.
R. W. JONES and K. C. HAMNER 314–316

Absence of acid phosphatase from chloroplast of spinach and iris.
F. D. H. MACDOWALL 317–318

Symptoms of molybdenum deficiency in tobacco.
ROBERT A. STEINBERG 319–322

The use of seeds with low content of trace elements in studies on essentiality of micro-nutrients ..... ARTTURI I. VIRTANEN 323–324

Partial separation of the plastid pigments by paper chromatography ..... E. F. LIND, H. C. LANE and L. S. GLEASON 325–328

The distribution of C^{14} in the root and shoot apices of young corn plants ..... G. S. RABIDEAU and LEO W. MERICLE 329–333

Water-cooled lamp systems with refluxing aqueous filters.
ROBERT B. WITHROW and VICTOR ELSTAD 334–338

Notes 339–341

NUMBER 3. JULY

Kinetics of auxin interaction.
D. HAROLD MCRAE, ROBERT J. FOSTER and JAMES BONNER 343–355

The diurnal variation in the translocation of minerals across bean roots ..... JOHN B. HANSON and ORLIN BIDDULPH 356–370

Heavy-metal nutrition and iron chlorosis of citrus seedlings.
PAUL F. SMITH and ALSTON W. SPECHT 371–382

Studies on the chemistry of the living bark of the black locust in relation to its frost hardiness. V. Seasonal transformation and variations in the carbohydrates: starch-sucrose interconversions ... D. SIMINOVITCH, C. M. WILSON and D. R. BRIGGS 383–401

Investigations of nitrogen compounds and nitrogen metabolism in plants. III. γ-aminobutyric acid in plants, with special reference to the potato tuber and a new procedure for isolating amino acids other than α-amino acids.
J. F. THOMPSON, J. K. POLLARD and F. C. STEWARD 401–414

An atypical growth of cabbage seedling roots. III. Tissue culture and physiological comparisons of typical and atypical roots.
A. T. JAGENDORF and D. M. BONNER 415–427

Some relationships of sterols to plant growth.
GEORGE HELMKAMP and JAMES BONNER 428–436

The effect of sodium trichloroacetate upon the metabolism of wheat seedlings (*Triticum vulgare* L.).
THEODORE L. REBSTOCK, CHARLES L. HAMNER, RICHARD W. LUECKE and HAROLD M. SELL 437–442

Auxin relations of a dwarf pea ..... G. J. VON ABRAMS 443–456

The role of boron in the translocation of sucrose.
HUGH G. GAUCH and W. M. DUGGER, JR. 457–466

Changes in the carbohydrate reserves of ladino white clover following defoliation.
C. H. MORAN, V. G. SPRAGUE and J. T. SULLIVAN 467–474

Bolting and flowering of sugar beets in continuous darkness.
J. M. FIFE and CHARLES PRICE 475–480

Comparative stimulation of parthenocarpy in the tomato by various indole compounds.
H. M. SELL, S. H. WITTWER, T. L. REBSTOCK and C. T. REDEMANN 481–487

Iron and copper enzymes in leaf lamina of tobacco when deficient in micronutrients or grown on calcareous and organic soils.
JOHN C. BROWN and ROBERT A. STEINBERG 488–494

The effect of the dominance of a metabolic system requiring iron or copper on the development of lime-induced chlorosis.
J. C. BROWN 495–502

Relationship of seasonal trends in carbohydrate and nitrogen levels and effects of girdling and spraying with sucrose and urea to the nutritional interpretation of boll shedding in cotton.
FRANK M. EATON and DAVID R. ERGLE 503–520
The climacteric rise in fruit respiration as controlled by phosphorylative coupling.
ADELE MILLERD, JAMES BONNER and JACOB B. BIALE 521–531
Distribution of total soluble solids, ascorbic acid, total acid, and bromelin activity in the fruit of the Natal pineapple (*Ananas comosus* L. Merr.).
ERSTON V. MILLER and GLADYS DOWNEY HALL 532–534
The composition of plant fractions extracted with 80% alcohol.
CHARLES C. WOODWARD and GLENN S. RABIDEAU 535–538
Nitrate reducion by Chlorella ..... EDWIN A. DAVIS 539–544
Bioelectric potentials of tumor-infected plants.
J. B. WILCOX, J. R. KNIGHT and A. A. BLESS 545–549
Carotinoids in grapefruit, *Citrus paradisi*.
MUSAHIB-UD-DIN KHAN and G. MACKINNEY 550–552
Notes 553–555

NUMBER 4. OCTOBER

The physical environment and oxidative and phosphorylative capacities of higher plant mitochondria ..... GEORGE G. LATIES 557–575
The absorption and translocation of iron.
J. H. REDISKE and O. BIDDULPH 576–593
The absorption and translocation of strontium by plants.
J. H. REDISKE and A. A. SELDERS 594–605
Concentration and translocation of nitrogen compounds in the corn plant (*Zea mays*) during grain development.
R. E. HAY, E. B. EARLEY and E. E. DETURK 606–621
Inhibition of auxin effects by 2,4,6-trichlorophenoxyacetic acid.
OTTO L. HOFFMANN 622–628
Studies on the chemistry of the living bark of the black locust tree in relation to frost hardiness. VI. Amylase and phosphorylase systems of the bark tissues.
M. H. EWART, D. SIMINOVITCH and D. R. BRIGGS 629–644
The influence of soil physical condition during the flowering period on nectar production in snapdragon.
R. W. SHUEL and J. A. SHIVAS 645–651
The effect of magnesium concentration on chlorophyll and catalase development in Chlorella.
BERNARD J. FINKLE and DAVID APPLEMAN 652–663
The effect of magnesium concentration on growth of Chlorella.
BERNARD J. FINKLE and DAVID APPLEMAN 664–673

Aluminum toxicity studies with radioactive phosphorus.
KENNETH E. WRIGHT and BARBARA A. DONAHUE 674–680
Formation of esters by yeast. II. Investigations with cellular suspensions of *Hansenula anomala*.
JOSEPH TABACHNICK and M. A. JOSLYN 681–692
Further evidence of persistence of the 2,4-D stimulus in cotton.
WAYNE J. MCILRATH and DAVID R. ERGLE 693–702
Photosynthesis in the potato under field conditions.
H. W. CHAPMAN and W. E. LOOMIS 703–716
Absorption and metabolism of tritium oxide and tritium gas by bean plants ..... J. F. CLINE 717–723
Enzymatic synthesis of glutamine in higher plants.
GEORGE G. WEBSTER 724–727
Enzymatic synthesis of gamma-glutamyl-cysteine in higher plants.
GEORGE G. WEBSTER 728–730
The biosynthesis of carbon-14-labeled compounds. III. The separation and isolation of sugars by ion-exchange chromatography ..... G. R. NOGGLE and L. P. ZILL 731–735
The use of cation-exchange resins for the hydrolysis of sucrose in plant extracts ..... G. R. NOGGLE 736–740
Conversion of C^{14} labeled acetate to citric and malic acids in the tomato fruit.
CHIH H. WANG, ELMER HANSEN and BERT E. CHRISTENSEN 741–745
A technique for removal of aseptic cylinders from carrot root.
RICHARD D. NORTHCRAFT 746–747
Pantothenic acid and acetic acid utilization in tomato fruit-set.
A. C. LEOPOLD, FRANCES S. GUERNSEY and RUBLE LANGSTON 748–751
Growth of tobacco seedlings with nitrate and its reduction products ..... ROBERT A. STEINBERG 752–754
Responses of plants to rhenium . R. D. WOOD and H. C. HARRISON 755–758
Notes 759–763
General Index, Volume 28 764–778

NOTICE TO CONTRIBUTORS: PLANT PHYSIOLOGY now requires two copies of all manuscripts submitted, an original type copy and first carbon, and two sets of figures. Clear photographs, adequate for reproduction are preferred. To the greatest extent possible, figures should be grouped so that a single zinc etching will include 2, 4, 6, or 8 figures. Half tones and line drawings must not be grouped together. Please note, that figures will be reduced to 3″ in width, or a group to 6″ in width. Uniform lettering and size is required in grouping figures. The grouping of figures may save the Society nearly $1000 per year, so your cooperation is solicited.

Care on the part of the authors will not only simplify the editorial task, but will shorten the time of appearance of a paper in print. In particular, graduate students should consult a senior faculty member concerning format, style, and figures, as well as for the scientific content. A retyped thesis rarely is in form for publication as a scientific paper.

GENERAL INDEX

A

Absence of acid phosphatase from chloroplasts of spinach and iris, 317

Absorption and metabolism of tritium oxide and tritium gas by bean plants, 717

Absorption and translocation of iron, the, 576

Absorption and translocation of strontium by plants, the, 594

Acetate, C^{14}-labeled, conversion of to citric and malic acids in the tomato fruit, 741

Acetic acid and pantothenic acid utilization in tomato fruit-set, 748

Accumulation and distribution of molybdenum in the cotton plant, 275

Acid phosphatase, absence of, from chloroplasts of spinach and iris, 317

Acid total and bromelin activity in the fruit of the Natal pineapple (*Ananas comosus*), distribution of total soluble solids, ascorbic acid and, 532

Advances in Agronomy, Volume IV, A. G. Norman, Editor, 148

Alcohol, 80%, the composition of plant fractions extracted with, 535

Alexopoulos, C. J., Introductory Mycology, 341

Alga, blue-green, Anabaena, some respiratory characteristics of the, 63

Aluminum toxicity studies with radioactive phosphorus, 674

Amino acids, a special procedure for isolating from α-amino acids. Aminobutyric acids with special reference to the potato tuber. Investigations of nitrogen compounds and nitrogen metabolism in plants, 401

Amino acid composition, the relation of the, to the development of oats, 77

Aminobutyric acids in plants, with special reference to the potato tuber and a new procedure for isolating amino acids other than α-amino acids. Investigations of nitrogen compounds and nitrogen metabolism in plants, 401

Ammonium ion, preferential assimilation of, by *Chlorella vulgaris*, 299

Amylase and phosphorylase systems of the bark tissues—Studies of the chemistry of the living bark of the black locust tree in relation to frost hardiness, 629

Amylase, phosphorylase, phosphatase, catalase and peroxidase activity in wheat, the effect of 2,4-dichlorophenoxyacetic acid on, 135

Anabaena, blue-green alga, some respiratory characteristics of the, 63

Anderson, D. B., Plant Physiology, 147

Annual Review of Biochemistry, Volume XXI, J. Murray Luck, Editor, 147

Apices, root and shoot, the distribution of C^{14} in the, of young corn plants, 329

Appleman, David, The effect of magnesium concentration on chlorophyll and catalase development in Chlorella, 652

Appleman, David, The effect of magnesium concentration on growth of Chlorella, 664

Application of growth regulators, carbohydrate metabolism in the tomato fruit as affected by pollination, fertilization and, 255

Aseptic technique for removal of cylinders from carrot root, 746

Ascorbic acid, the intracellular distribution of, in turnip leaves, 314

Ascorbic acid, total soluble solids, total acid and bromelin activity, distribution of, in the fruit of the Natal pineapple (*Ananas comosus* L. Merr.), 532

Assimilation, preferential, of ammonium ion by *Chlorella vulgaris*, 299

Atypical growth of cabbage seedling roots, an, III. Tissue culture and physiological comparisons of typical and atypical roots, 415

Autoradiographic technique for detailed studies with plant tissue, an, 143

Auxin effects by 2,4,6-trichlorophenoxyacetic acid, inhibition of, 622

Auxin interaction, kinetics of, 343

Auxin relations of a dwarf pea, the, 443

Avena coleoptile, effect of inorganic ions and their conductances on geotropic curvature of, 99

Averill, Warren, Phosphorylase and a branching enzyme in squash, 287

B

Bacon, Charles Walter, Obituary, 339
Bark, living, studies of the chemistry of the, of the black locust in relation to its frost hardiness. III. The validity of plasmolysis and desiccation tests for determining the frost hardiness of bark tissue, 15
IV. Effects of ringing on translocation, protein synthesis and the development of hardiness, 177
V. Seasonal transformations and variation in the carbohydrates: Starch-sucrose interconversions, 383
VI. Amylase and phosphorylase systems of the bark tissues, 629
Barnett, Robert C., Phosphogluconic dehydrogenase in higher plants, 115
Barton, Lela V., Physiology of Seeds, 339
Bean, influence of visible and near infrared radiant energy on organ development and pigment synthesis in, and corn, 1
Bean plants, absorption and metabolism of tritium gas and tritium oxide by, 717
Beans (*Phaseolus vulgaris*), Factors affecting cotyledonal cracking during the germination of, 267
Bean roots, the diurnal variations in the translocation of minerals across, 356
Beets, sugar, bolting and flowering of, in continuous darkness, 475
Biale, Jacob, The climacteric rise in fruit respiration as controlled by phosphorylative coupling, 521
Biddulph, O., The absorption and translocation of iron, 576
Biddulph, Orlin, The diurnal variation in the translocation of minerals across bean roots, 356
Bioelectric potentials of tumor-infected plants, 545
Biosynthesis of carbon-14-labeled compounds. III. The separation and isolation of sugars by ion-exchange chromatography, the, 731
Black locust, studies of the chemistry of the living bark of the, in relation to its frost hardiness. III. The validity of plasmolysis and desiccation tests for determining the frost hardiness of bark tissue, 15
Black locust tree, studies on the chemistry of the living bark of the, in relation to frost hardiness. IV. Effects of ringing on translocation, protein synthesis and the development of hardiness, 177
Black locust, studies on the chemistry of the living bark of the, in relation to its frost hardiness. V. Seasonal transformations and variations in the carbohydrates: Starch-sucrose interconversions, 383
Black locust tree, studies of the chemistry of the living bark of the, in relation to frost hardiness. VI. Amylase and phosphorylase systems of the bark tissues, 629
Bless, A. A., Bioelectric potentials of tumor-infected plants, 545
Block, R. J., Paper Chromatography (A Laboratory Manual), 147
Blue-green alga, Anabaena, some respiratory characteristics of the, 63
Bonner, D. M., An atypical growth of cabage seedling roots. III. Tissue culture and physiological comparisons of typical and atypical roots, 415
Bonner, James, The climacteric rise in fruit respiration as controlled by phosphorylative coupling, 521
Bonner, J., Kinetics of auxin interaction, 343
Bonner, James, Some relationships of sterols to plant growth, 428
Boron, the role of, in the translocation of sucrose, 457
Boron isotopes, stable, effect of, on growth of tobacco in solution cultures, 127
Boyce, A. M., Effect of quality and intensity of solar radiation on injury of lemon fruit by sulphur treatment in the field, 151
Briggs, D. R., Studies on the chemistry of the living black locust tree in relation to frost hardiness. VI. Amylase and phosphorylase systems of the bark tissues, 629
Bromelin activity, distribution of total soluble solids, ascorbic acid, total acid and, in the fruit of the Natal pineapple (*Ananas comosus* L. Merr.), 532
Briggs, D. R., Studies on the chemistry of the living bark of the black locust in relation to its frost hardiness. III.

The validity of plasmolysis and desiccation tests for determining the frost hardiness of bark tissue, 15

Briggs, D. R., Studies on the chemistry of the living bark of the black locust tree in relation to frost hardiness. IV. Effects of ringing on translocation, protein synthesis and the development of hardiness, 177

Briggs, D. R., Studies on the chemistry of the living bark of the black locust in relation to its frost hardiness. V. Seasonal transformations and variations in the carbohydrates: Starch-sucrose interconversions, 383

Brown, J. C., The effect of the dominance of a metabolic system requiring iron or copper on the development of lime-induced chlorosis, 495

Brown, John C., Iron and copper enzymes in leaf lamina of tobacco when deficient in micronutrients or grown on calcareous and organic soils, 488

C

C^{14}, the distribution of, in the root and shoot apices of young corn plants, 329

C^{14}, the use of, in locating growth regions in the cell walls of elongating cotton fibers, 281

$C^{14}O_2$ production, I. Relative rates of, by certain vegetable plants treated with labeled urea, the metabolism of foliar-applied urea, 70

Cabbage seedling roots, an atypical growth of, III. Tissue culture and physiological comparisons of typical and atypical roots, 415

Carbohydrate and nitrogen levels, seasonal trends in, and effects of girdling and spraying with sucrose and urea, the nutritional interpretation of boll shedding in cotton, 503

Carbohydrate content, the sprouting of sweetgum in relation to season of cutting and, 35

Carbohydrate metabolism in the tomato fruit as affected by pollination, fertilization and application of growth regulators, 255

Carbohydrate reserves, changes in the, of ladino white clover following defoliation, 467

Carbohydrates, reserve, in orchard grass cut for hay, 304

Carotenoids in grapefruit, *Citrus paradisi*, 550

Carrot root, a technique for removal of aseptic cylinders from, 746

Catalase development in Chlorella, the effect of magnesium concentration on chlorophyll and, 652

Catalase, phosphorylase, phosphatase, amylase and peroxidase activity in wheat, the effect of 2,4-dichlorophenoxyacetic acid on, 135

Cell walls of elongating cotton fibers, the use of C^{14} in locating growth regions in the, 281

Changes in the carbohydrate reserves of ladino white clover following defoliation, 467

Chapman, H. W., Photosynthesis in the potato under field conditions, 703

Chemistry of the living bark of the black locust tree, studies on the, in relation to frost hardiness. IV. Effects of ringing on translocation, protein synthesis and the development of hardiness, 177

Chemistry, studies on the, of the living bark of the black locust in relation to its frost hardiness. III. The validity of plasmolysis and desiccation tests for determining the frost hardiness of bark tissue, 15

Chlorella, nitrate reduction by, 539

Chlorella, the effect of magnesium concentration on chlorophyll and catalase development in, 652

Chlorella, the effect of magnesium concentration on growth of, 664

Chlorella vulgaris, preferential assimilation of ammonium ion by, 299

Chlorophyll and catalase development in Chlorella, the effect of magnesium concentration on, 652

Chloroplast fragments, isolated, electrode reactions of, 89

Chloroplasts of spinach and iris, absence of acid phosphatase from, 317

Chlorosis, lime-induced, the effect of the dominance of a metabolic system requiring iron or copper on the development of, 495

Chromatography, ion-exchange, the separation and isolation of sugars by. The biosynthesis of carbon-14-labeled compounds, 731

CHRISTENSON, BERT E., Conversion of C^{14}-labeled acetate to citric and malic acids in the tomato fruit, 741

Citric and malic acids in the tomato fruit, conversion of C^{14}-labeled acetate to, 741

Citrus paradisi, grapefruit, carotenoids in, 550

Citrus seedlings, heavy metal nutrition and iron chlorosis of, 371

Climacteric rise in fruit respiration as controlled by phosphorylative coupling, the, 521

CLINE, J. F., Absorption and metabolism of tritium oxide and tritium gas by bean plants, 717

Chloride concentration, optimum, for malt diastase activity as a function of temperature, 140

Clover, ladino white, changes in the carbohydrate reserves of, following defoliation, 467

Comparative stimulation of parthenocarpy in the tomato by various indole compounds, 481

Composition of plant fractions extracted with 80% alcohol, the, 535

Concentration and translocation of nitrogen compounds in the corn plant (*Zea mays*) during grain development, 606

CONN, ERIC E., Phosphogluconic dehydrogenase in higher plants, 115

Conversion of C^{14}-labeled acetate to citric and malic acids in the tomato fruit, 741

Copper, iron and, enzymes in leaf lamina of tobacco when deficient in micronutrients or grown on calcareous and organic soils, 488

Copper or iron, on the development of lime-induced chlorosis, The effect of the dominance of a metabolic system requiring, 495

Corn, influence of visible and near infrared radiant energy on organ development and pigment synthesis in bean and, 1

Corn plant (*Zea mays*) during grain development, concentration and translocation of nitrogen compounds in the, 606

Corn plants, young, the distribution of C^{14} in the root and shoot apices of, 329

Cotton fibers, elongating, the use of C^{14} in locating growth regions in the cell walls of, 281

Cotton, further evidence of the persistence of the 2,4-D stimulus in, 693

Cotton, the nutritional interpretation of boll shedding in, seasonal trends in carbohydrate and nitrogen levels and effects of girdling and spraying with sucrose and urea, 503

Cotton plant, accumulation and distribution of molybdenum in the, 275

Cotyledonal cracking during the germination of beans (*Phaseolus vulgaris*), factors affecting, 267

COWIE, L. M., The effect of 2,4-dichlorophenoxyacetic acid on phosphorylase, phosphatase, amylase, catalase, and peroxidase activity in wheat, 135

CROCKER, W., Physiology of Seeds, 339

Curvature, geotropic, of the Avena coleoptile, effect of inorganic ions and their conductances on, 99

Cytochemistry: A Critical Approach, by J. F. DANIELLI, 340

Cutting, the sprouting of sweetgum in relation to season of, and carbohydrate content, 35

D

DANIELLI, J. F., Cytochemistry: A Critical Approach, 340

DAVIS, EDWIN A., Nitrate reduction by Chlorella, 539

Deficiency, molybdenum, symptoms of, in tobacco, 319

Dehydrogenase, phosphogluconic, in higher plants, 115

Desiccation tests, III. The validity of plasmolysis and, for determining the frost hardiness of bark tissue. Studies on the chemistry of the living bark of the black locust in relation to its frost hardiness, 15

DETURK, E. E., Concentration and translocation of nitrogen compounds in the corn plant (*Zea mays*) during grain development, 606

Development, floral induction and, in orchard grass, 201

Development of hardiness, IV. Effects of ringing on translocation, protein synthesis and the, Studies on the chemistry of the living bark of the black

locust tree in relation to frost hardiness, 177
Development, organ, influence of visible and near infrared radiant energy on, and pigment synthesis in bean and corn, 1
Diastase, activity, malt, as a function of temperature, optimum chloride concentration for, 140
2,4-Dichlorophenoxyacetic acid, the effect of, on phosphorylase, phosphatase, amylase, catalase, and peroxidase activity on wheat, 135
Diller, Violet M., Preferential assimilation of ammonium ion by *Chlorella vulgaris*, 299
Distribution of C^{14} in the root and shoot apices of young corn plants, the, 329
Distribution of molybdenum in the cotton plant, accumulation and, 275
Distribution of total soluble solids, ascorbic acid, total acid and bromelin activity in the fruit of the Natal pineapple (*Ananas comosus* L. Merr.), 532
Distribution, the intracellular, of ascorbic acid in turnip leaves, 314
Dobbs, Vergil W., The relation of the amino acid composition to the development of oats, 77
Donahue, B. A., Aluminum toxicity studies with radioactive phosphorus, 674
Dugger, W. M., Jr., The role of boron in the translocation of sucrose, 457
Dugger, W. M., Jr., An autoradiographic technique for detailed studies with plant tissue, 143
Dwarf pea, the auxin relations of a, 443

E

Earley, E. B., Concentration and translocation of nitrogen compounds in the corn plant (*Zea mays*) during grain development, 606
Eaton, Frank M., The nutritional interpretation of boll shedding in cotton: Seasonal trends in carbohydrate and nitrogen levels and effects of girdling and spraying with sucrose and urea, 503
Effect of 2,4-dichlorophenoxyacetic acid on phosphorylase, phosphatase, amylase, catalase and peroxidase activity in wheat, the, 135
Effect of inorganic ions and their conductances on geotropic curvature of the Avena coleoptile, 99
Effect of magnesium concentration on chlorophyll and catalase development in Chlorella, the, 652
Effect of magnesium concentration on growth of Chlorella, the, 664
Effect of sodium trichloracetate upon the metabolism of wheat seedlings, the, 437
Effects of maleic hydrazide on flower initiation, the, 293
Effect of quality and intensity of solar radiation on injury of lemon fruit by sulphur treatment in the field, 151
Effect of stable boron isotopes on growth of tobacco in solution cultures, 127
The effect of the dominance of a metabolic system requiring iron or copper on the development of lime-induced chlorosis, 495
Electrode reactions of isolated chloroplast fragments, 89
Elstad, V., Influence of visible and near infrared radiant energy on organ development and pigment synthesis in bean and corn, 1
Elstad, Victor, Water-cooled lamp systems with refluxing aqueous filters, 334
Energy, visible and near infrared radiant, influence of, on organ development and pigment synthesis in bean and corn, 1
Engle, H. B., Effect of stable boron isotopes on growth of tobacco in solution cultures, 127
Enzymatic synthesis of gamma-glutamylcysteine in higher plants, 728
Enzymatic synthesis of glutamine in higher plants, 724
Enzyme, a branching, in squash, phosphorylase and, 287
Enzymes, iron and copper, in leaf lamina of tobacco when deficient in micronutrients or grown on calcareous and organic soils, 488
Ergle, David R., Further evidence of persistence of the 2,4-D stimulus in cotton, 693
Ergle, David R., The nutritional interpretation of boll shedding in cotton: Seasonal trends in carbohydrate and

nitrogen levels and effects of girdling and spraying with sucrose and urea, 503

ESAU, KATHERINE, Plant Anatomy, 340

Esters, formation of by yeast. II. Investigations with cellular suspensions of *Hansenula anomala*, 681

EVANS, HAROLD J., Pyridine nucleotide–nitrate reductase from extracts of higher plants, 233

EWART, M. H., Studies on the chemistry of the living bark of the black locust tree in relation to frost hardiness. VI. Amylase and phosphorylase systems of the bark tissues, 629

Extracts, pyridine nucleotide–nitrate reductase from, of higher plants, 233

EYSTER, H. C., Optimum chloride concentration for malt diastase activity as a function of temperature, 140

F

Factors affecting cotyledonal cracking during the germination of beans (*Phaseolus vulgaris*), 267

Fertilization, pollination and application of growth regulators, carbohydrate metabolism in the tomato fruit as affected by, 255

Fibers, elongating cotton, the use of C^{14} in locating growth regions in the cell walls of, 281

FIFE, J. M., Bolting and flowering of sugar beets in continuous darkness, 475

Filters for the isolation of narrow regions in the visible and near-visible spectrum, 105

Filters, refluxing aqueous, water-cooled lamp systems with, 334

FINKLE, BERNARD J., The effect of magnesium concentration on chlorophyll and catalase development in Chlorella, 652

FINKLE, BERNARD J., The effect of magnesium concentration on growth of Chlorella, 664

Floral induction and development in orchard grass, 201

Flower initiation, the effects of maleic hydrazide on, 293

Flowering, low temperature inductions of, in a *Nicotiana rustica* × *N. tabacum* hybrid, 131

Flowering period, influence of soil physical condition during, on nectar production in snapdragon, 645

Foliar-applied urea, the metabolism of, I. Relative rates of $C^{14}O_2$ production by certain vegetable plants treated with labeled urea, 70

Formation of esters by yeast. II. Investigations with cellular suspensions of *Hansenula anomala*, 681

FOSTER, R. J., Kinetics of auxin interaction, 343

Fragments, isolated chloroplast, electrode reactions of, 89

Frenching in ragweed (*Ambrosia artemisiifolia* L.), 123

FRENKEL, ALBERT W., Some respiratory characteristics of the blue-green alga, Anabaena, 63

Frost hardiness, studies on the chemistry of the living bark of the black locust in relation to its, III. The validity of plasmolysis and desiccation tests for determining the frost hardiness of bark tissue, 15

Frost hardiness, studies on the chemistry of the living bark of the black locust tree in relation to, IV. Effects of ringing and translocation, protein synthesis and the development of hardiness, 177

Frost hardiness, studies on the chemistry of the living bark of the black locust in relation to its, V. Seasonal transformations and variations in the carbohydrates: Starch-sucrose interconversions, 383

Frost hardiness, studies of the chemistry of the living bark of the black locust tree in relation to, VI. Amylase and phosphorylase systems of the bark tissues, 629

Fruit respiration, the climacteric rise in, as controlled by phosphorylative coupling, 521

Further evidence of the persistence of the 2,4-D stimulus in cotton, 693

G

GAUCH, HUGH G., The role of boron in the translocation of sucrose, 457

GARDNER, F. P., Floral induction and development in orchard grass, 201

Geotropic curvature of the Avena coleoptile, effect of inorganic ions and their conductances on, 99
Germination of beans (*Phaseolus vulgaris*), factors affecting cotyledonal cracking during the, 267
GILMOUR, H. S. A., Electrode reactions of isolated chloroplast fragments, 89
Girdling and spraying with sucrose and urea, seasonal trends in carbohydrate and nitrogen levels and effects of, the nutritional interpretation of boll shedding in cotton, 503
GLEASON, L. S., Partial separation of the plastid pigments by paper chromatography, 325
Glutamine in higher plants, enzymatic synthesis of, 724
Glutamyl-cysteine, gamma, in higher plants, enzymatic synthesis of, 728
Grain development, during, concentration and translocation of nitrogen compounds in the corn plant (*Zea mays*), 606
Grapefruit, *Citrus paradisi*, carotenoids in, 550
Growth, I. Initial, and transpiration studies, the physiological action of smog on plants, 50
Growth of Chlorella, the effect of magnesium concentration on, 664
Growth of tobacco seedlings with nitrate and its reduction products, 752
Growth regions, the use of C^{14} in locating, in the cell walls of elongating cotton fibers, 281
Growth regulators, carbohydrate metabolism in the tomato fruit as affected by pollination, fertilization and application of, 255
Growth regulators, on the mechanism of action of, 218
Growth of tobacco, effect of stable boron isotopes on, in solution cultures, 127
GUERNSEY, FRANCES S., Pantothenic acid and acetic acid utilization in tomato fruit-set, 748

H

HALL, GLADYS DOWNEY, Distribution of total soluble solids, ascorbic acid, total acid and bromelin activity in the fruit of the Natal pineapple (*Ananas comosus* L. Merr.), 532
HAMNER, CHARLES L., The effect of sodium trichloroacetate upon the metabolism of wheat seedlings, 437
HAMNER, K. C., The intracellular distribution of ascorbic acid in turnip leaves, 314
HANSCH, CORWIN, On the mechanism of action of growth regulators, 218
Hansenula anomala, Investigations with cellular suspensions of. Formation of esters by yeast, 681
HANSON, ELMER, Conversion of C^{14}-labeled acetate to citric acid and malic acids in the tomato fruit, 741
HANSON, JOHN B., The diurnal variation in the translocation of minerals across bean roots, 356
HARRISON, H. C., Responses of plants to rhenium, 755
HAY, R. E., Concentration and translocation of nitrogen compounds in the corn plant (*Zea mays*) during grain development, 606
Heavy metal nutrition and iron chlorosis of citrus seedlings, 371
HELMKAMP, GEORGE, Some relationships of sterols to plant growth, 428
HINSVARK, O. N., The metabolism of foliar-applied urea. I. Relative rates of $C^{14}O_2$ production by certain vegetable plants treated with labeled urea, 70
HOFFMANN, OTTO L., Inhibition of auxin effects of 2,4,6-trichlorophenoxyacetic acid, 622
Hybrid, *Nicotiana rustica* × *N. tabacum*, low temperature inductions of flowering in a, 131

I

Indole compounds, various, comparative stimulation of parthenocarpy in the tomato by, 481
Inductions, low temperature, of flowering in a *Nicotiana rustica* × *N. tabacum* hybrid, 131
Influence of soil physical condition during the flowering period on nectar production in snapdragon, the, 645
Influence of visible and near infrared radiant energy on organ development and pigment synthesis in bean and corn, 1

Infrared radiant energy, visible and near, influence of, on organ development and pigment synthesis in bean and corn, 1
Inhibition of auxin effects by 2,4,6-trichlorophenoxyacetic acid, 622
Injury of lemon fruit by sulphur treatment in the field, effect of quality and intensity of solar radiation on, 151
Inorganic ions, effect of, and their conductances on geotropic curvature of the Avena coleoptile, 99
Intracellular distribution of ascorbic acid in turnip leaves, the, 314
Introductory Mycology, by C. J. Alexopoulos, 341
Investigations of nitrogen compounds and nitrogen metabolism in plants. III. Aminobutyric acid in plants with special reference to the potato tuber and a new procedure for isolating amino acids other than α-amino acids, 401
Ions, inorganic, and their conductances, effect of, on geotropic curvature of the Avena coleoptile, 99
Iris, absence of acid phosphatase from chloroplasts of spinach and, 317
Iron and copper enzymes in leaf lamina of tobacco when deficient in micronutrients or grown on calcareous and organic soils, 488
Iron chlorosis of citrus seedlings, heavy metal nutrition and, 371
Iron or copper, on the development of lime-induced chlorosis, the effect of the dominance of a metabolic system requiring, 495
Iron, the absorption and translocation of, 576
Isolation of narrow regions, filters for the, in the visible and near-visible spectrum, 105
Isotopes, stable boron, effect of, on growth of tobacco in solution cultures, 127

J

Jagendorf, A. T., An atypical growth of cabbage seedling roots. III. Tissue culture and physiological comparisons of typical and atypical roots, 415
Joham, Howard E., Accumulation and distribution of molybdenum in the cotton plant, 275
Jones, Linus H., Frenching in ragweed (*Ambrosia artemisiifolia* L.), 123
Jones, R. W., The intracellular distribution of ascorbic acid in turnip leaves, 314
Joslyn, M. A., Formation of esters by yeast. II. Investigations with cellular suspensions of *Hansenula anomala*, 681

K

Kersten, Harold J., Preferential assimilation of ammonium ion by *Chlorella vulgaris*, 299
Khan, Musahib-ud-din, Carotenoids in grapefruit, *Citrus paradisi*, 550
Kinetics of auxin interaction, 343
Klein, W. H., Influence of visible and near infrared radiant energy on organ development and pigment synthesis in bean and corn, 1
Klein, W. H., The effects of maleic hydrazide on flower initiation, 293
Knight, J. R., Bioelectric potentials of tumor-infected plants, 545
Koritz, Helen Garman, The physiological action of smog on plants. I. Initial growth and transpiration studies, 50

L

Lamp systems, water-cooled, with refluxing aqueous filters, 334
Lane, H. C., Partial separation of the plastid pigments by paper chromatography, 325
Langston, Ruble, Pantothenic acid and acetic acid utilization in tomato fruit-set, 748
Laties, George G., The physical environment and oxidative and phosphorylative capacities of higher plant mitochondria, 557
Leaves, turnip, the intracellular distribution of ascorbic acid in, 314
Lemon fruit, effect of quality and intensity of solar radiation on injury of, by sulphur treatment in the field, 151
Leopold, A. C., The effects of maleic hydrazide on flower initiation, 293
Leopold, A. C., Pantothenic acid and acetic acid utilization in tomato fruit-set, 748

LeStrange, R., Paper Chromatography (A Laboratory Manual), 147
Lime-induced chlorosis, the effect of the dominance of a metabolic system requiring iron or copper on the development of, 495
Lind, E. F., Partial separation of the plastid pigments by paper chromatography, 325
Loomis, W. E., Floral induction and development in orchard grass, 201
Loomis, W. E., Photosynthesis in the potato under field conditions, 703
Low temperature inductions of flowering in a *Nicotiana rustica* × *N. tabacum* hybrid, 131
Luck, J. Murray, Annual Review of Biochemistry, Volume XXI, 147
Luecke, Richard W., The effect of sodium trichloroacetate upon the metabolism of wheat seedlings, 437
Lumry, Rufus, Electrode reactions of isolated chloroplast fragments, 89

M

MacDowall, F. D. H., Absence of acid phosphatase from chloroplasts of spinach and iris, 317
MacKinney, G., Carotenoids in grapefruit, *Citrus paradisi*, 550
Magnesium concentration, the effect of, on chlorophyll and catalase development in Chlorella, 652
Magnesium concentration, the effect of, on growth of Chlorella, 664
Maleic hydrazide, the effects of, on flower initiation, 293
Malt diastase activity as a function of temperature, optimum chloride concentration for, 140
Marrè, E., Carbohydrate metabolism in the tomato fruit as affected by pollination, fertilization and application of growth regulators, 255
McCollum, J. P., Factors affecting cotyledonal cracking during the germination of beans (*Phaseolus vulgaris*), 267
McCoy, Thomas A., The relation of the amino acid composition to the development of oats, 77
McIlrath, Wayne J., Further evidence of persistence of the 2,4-D stimulus in cotton, 693
McMurtrey, J. E., Jr., Effect of stable boron isotopes on growth of tobacco in solution cultures, 127
McRae, D. H., Kinetics of auxin interaction, 343
Mechanism of action of growth regulators, on the, 218
Mericle, Leo W., The distribution of C^{14} in the root and shoot apices of young corn plants, 329
Metabolism of foliar-applied urea, the, I. Relative rates of $C^{14}O_2$ production by certain vegetable plants treated with labeled urea, 70
Meyer, B. S., Plant Physiology, 147
Metabolism, and absorption, of tritium oxide and tritium gas by bean plants, 717
Metabolism, carbohydrate, in the tomato fruit as affected by pollination, fertilization and application of growth regulators, 255
Micro-nutrients, the use of seeds with low content of trace elements in studies on essentiality of, 323
Micronutrients, iron and copper enzymes in leaf lamina of tobacco when deficient in, or grown on calcareous and organic soils, 488
Millerd, Adele, The climacteric rise in fruit respiration as controlled by phosphorylative coupling, 521
Miller, Erston V., Distribution of total soluble solids, ascorbic acid, total acid and bromelin activity in the fruit of the Natal pineapple (*Ananas comosus* L. Merr.), 532
Minerals, the diurnal variation in the translocation of, across bean roots, 356
Mitochondria, the physical environment and oxidative and phosphorylative capacities of higher plant, 557
Molybdenum deficiency in tobacco, symptoms of, 319
Molybdenum in the cotton plant, accumulation and distribution of, 275
Moran, C. H., Changes in the carbohydrate reserves of ladino white clover following defoliation, 467
Moreland, D. E., An autoradiographic technique for detailed studies with plant tissue, 143
Muir, Robert M., On the mechanism of action of growth regulators, 218

MURNEEK, A. E., Carbohydrate metabolism in the tomato fruit as affected by pollination, fertilization and application of growth regulators, 255

N

NASON, ALVIN, Pyridine nucleotide-nitrate reductase from extracts of higher plants, 233

Nectar production in snapdragon, the influence of soil physical condition during the flowering period on, 645

Nicotiana rustica × *N. tabacum* hybrid, low temperature inductions of flowering in a, 131

Nitrate and its reduction products, growth of tobacco seedlings with, 752

Nitrate reduction by Chlorella, 539

Nitrogen compounds and metabolism in plants, investigations of, III. Aminobutyric acid in plants with special reference to the potato tuber and a new procedure for isolating amino acids other than α-amino acids, 401

Nitrogen compounds, concentration and translocation of, in the corn plant (*Zea mays*) during grain development, 606

Nitrogen levels, seasonal trends in carbohydrate and, and effects of girdling and spraying with sucrose and urea, The nutritional interpretation of boll shedding in cotton, 503

NOGGLE, G. R., The biosynthesis of carbon-14-labeled compounds. III. The separation and isolation of sugars by ion-exchange chromatography, 731

NOGGLE, G. R., The use of cation-exchange resins for the hydrolysis of sucrose in plant extracts, 736

NORMAN, A. G., Advances in Agronomy, Volume IV, 148

NORTHCRAFT, RICHARD D., A technique for removal of aseptic cylinders from carrot root, 746

Nucleotide–nitrate reductase, pyridine, from extracts of higher plants, 233

Nutrition, heavy metal, and iron chlorosis of citrus seedlings, 371

O

Oats, the relation of the amino acid composition to the development of, 77

O'KELLEY, JOSEPH C., The use of C^{14} in locating growth regions in the cell walls of elongating cotton fibers, 281

On the mechanism of action of growth regulators, 218

Optimum chloride concentration for malt diastase activity as a function of temperature, 140

Orchard grass cut for hay, reserve carbohydrates in, 304

Orchard grass, floral induction and development in, 201

Organ development, influence of visible and near infrared radiant energy on, and pigment synthesis in bean and corn, 1

P

Pantothenic acid and acetic acid utilization in tomato fruit-set, 748

Paper Chromatography (A Laboratory Manual), by R. J. BLOCK, R. LESTRANGE, and G. ZWEIG, 147

Paper chromatography, partial separation of the plastid pigments by, 325

Parthenocarpy, comparative stimulation of, in the tomato by various indole compounds, 481

Partial separation of the plastid pigments by paper chromatography, 325

Phaseolus vulgaris—Factors affecting cotyledonal cracking during the germination of beans, 267

PHILLIPS, THOMAS G., Phosphorylase and a branching enzyme in squash, 287

Phosphogluconic dehydrogenase in higher plants, 115

Phosphorus, aluminum toxicity studies with radioactive, 674

Phosphorylase and a branching enzyme in squash, 287

Phosphorylase, and amylase, systems of the bark tissues, I. Studies on the chemistry of the living bark of the black locust tree in relation to frost hardiness, 629

Phosphorylase, phosphatase, amylase, catalase, and peroxidase activity in wheat, the effect of 2,4-dichlorophenoxyacetic acid on, 135

Phosphorylative capacities of higher plant mitochondria, the physical environment and oxidative and, 557

Phosphorylative coupling, the climacteric rise in fruit respiration as controlled by, 521

Photosynthesis in the potato under field conditions, 703

Physical environment and oxidative and phosphorylative capacities of higher plant mitochondria, the, 557

Physiological action of smog on plants, the, I. Initial growth and transpiration studies, 50

Physiology of Seeds, by W. Crocker and Lela V. Barton, 339

Pigment synthesis in bean and corn, influence of visible and near infrared radiant energy on organ development and, 1

Pineapple, Natal (*Ananas comosus* L. Merr.), distribution of total soluble solids, ascorbic acid, total acid and bromelin activity in the fruit of the, 532

Plant Anatomy, by Katherine Esau, 340

Plant growth, some relationships of sterols to, 428

Plant Physiology, by B. S. Meyer and D. B. Anderson, 147

Plant tissue, an autoradiographic technique for detailed studies with, 143

Plants, certain vegetable, I. relative rates of $C^{14}O_2$ production by, treated with labeled urea. The metabolism of foliar-applied urea, 70

Plants, higher, phosphogluconic dehydrogenase in, 115

Plants, higher, pyridine nucleotide–nitrate reductase from extracts of, 233

Plants, the physiological action of smog on, I. Initial growth and transpiration studies, 50

Plasmolysis and desiccation tests, III. The validity of, for determining the frost hardiness of bark tissue. Studies on the chemistry of the living bark of the black locust in relation to its frost hardiness, 15

Plastid pigments by paper chromatography, partial separation of the, 325

Pollard, J. K., Investigations of nitrogen compounds and nitrogen metabolism in plants. III. Aminobutyric acid in plants with special reference to the potato tuber and a new procedure for isolating amino acids other than α-amino acids, 401

Pollination, fertilization and application of growth regulators, carbohydrate metabolism in the tomato fruit as affected by, 255

Potato, photosynthesis in the, under field conditions, 703

Potato tuber, aminobutyric acids in plants with special reference to, and a new procedure for isolating amino acids other than α-amino acids. Investigations of nitrogen compounds and nitrogen metabolism in plants, 401

Preferential assimilation of ammonium ion by *Chlorella vulgaris*, 299

Preparation of Manuscripts for Publication in Plant Physiology, 149

Price, Charles, Bolting and flowering of sugar beets in continuous darkness, 475

Price, L., Influences of visible and near infrared radiant energy on organ development and pigment synthesis in bean and corn, 1

Price, Leonard, Filters for the isolation of narrow regions in the visible and near-visible spectrum, 105

Protein synthesis, translocation, and the development of hardiness, IV. Effects of ringing on. Studies on the chemistry of the living bark of the black locust tree in relation to frost hardiness, 177

Pyridine nucleotide–nitrate reductase from extracts of higher plants, 233

Q

Quality and intensity of solar radiation, effect of, on injury of lemon fruit by sulphur treatment in the field, 151

R

Rabideau, G. S., The distribution of C^{14} in the root and shoot apices of young corn plants, 329

Rabideau, Glenn S., The composition of plant fractions extracted with 80% alcohol, 535

Radiant energy, visible and near infrared, influence of, on organ development and pigment synthesis in bean and corn, 11

Ragweed (*Ambrosia artemisiifolia* L.), frenching in, 123
Reactions, electrode, of isolated chloroplast fragments, 89
Rebstock, Theodore L., The effect of sodium trichloracetate upon the metabolism of wheat seedlings, 437
Rebstock, T. L., Comparative stimulation of parthenocarpy in the tomato by various indole compounds, 481
Redemann, C. T., Comparative stimulation of parthenocarpy in the tomato by various indole compounds, 481
Rediske, J. H., The absorption and translocation of iron, 576
Rediske, J. H., The absorption and translocation of strontium by plants, 594
Relation of the amino acid composition to the development of oats, the, 77
Reserve carbohydrates in orchard grass cut for hay, 304
Resins for the hydrolysis of sucrose in plant extracts, the use of cation-exchange, 736
Respiratory characteristics, some of the blue-green alga, Anabaena, 63
Responses of plants to rhenium, 755
Rhenium, responses of plants to, 755
Ringing, IV. Effects of, on translocation, protein synthesis and the development of hardiness. Studies on the chemistry of the living bark of the black locust tree in relation to frost hardiness, 177
Root and shoot apices of young corn plants, the distribution of C^{14} in the, 329
Roots, typical and atypical, III. Tissue culture and physiological comparisons of. An atypical growth of cabbage seedling roots, 415

S

Schrank, A. R., Effect of inorganic ions and their conductances on geotropic curvature of the Avena coleoptile, 99
Schuler, John F., Preferential assimilation of ammonium ion by *Chlorella vulgaris*, 299
Season of cutting and carbohydrate content, the sprouting of sweetgum in relation to, 35
Seeds, the use of, with low content of trace elements in studies on essentiality of micro-nutrients, 323
Selders, A. A., The absorption and translocation of strontium by plants, 594
Sell, Harold M., The effect of sodium trichloracetate upon the metabolism of wheat seedlings, 437
Sell, H. M., Comparative stimulation of parthenocarpy in the tomato by various indole compounds, 481
Semmens, Elizabeth S., Obituary, 146
Shivas, J. A., The influence of soil physical condition during the flowering period on nectar production in snapdragon, 645
Shuel, R. W., The influence of soil physical condition during the flowering period on nectar production in snapdragon, 645
Siminovitch, D., Studies on the chemistry of the living bark of the black locust in relation to its frost hardiness. III. The validity of plasmolysis and desiccation tests for determining the frost hardiness of bark tissue, 15
Siminovitch, D., Studies on the chemistry of the living bark of the black locust tree in relation to frost hardiness. IV. Effects of ringing on translocation, protein synthesis and the development of hardiness, 177
Siminovitch, D., Studies on the chemistry of the living bark of the black locust in relation to its frost hardiness. V. Seasonal transformations and variations in the carbohydrates: starch-sucrose interconversions, 383
Siminovitch, D., Studies on the chemistry of the living bark of the black locust in relation to its frost hardiness. VI. Amylase and phosphorylase systems of the bark tissues, 629
Smith, Paul F., Heavy metal nutrition and iron chlorosis of citrus seedlings, 371
Smog, the physiological action of, on plants. I. Initial growth and transpiration studies, 50
Snapdragon, The influence of soil physical condition during the flowering period on nectar production of, 645
Soil Microbiology, by S. A. Waksman, 340
Soil physical condition during the flower-

ing period on nectar production in snapdragon, the influence of, 645
Solar radiation, effect of quality and intensity of, on injury of lemon fruit by sulphur treatment in the field, 151
Solution cultures, effect of stable boron isotopes on growth of tobacco in, 127
Some relationships of sterols to plant growth, 428
Some respiratory characteristics of the blue-green alga, Anabaena, 63
Southern Section meeting, 1953, 339
Specht, Alston W., Heavy metal nutrition and iron chlorosis of citrus seedlings, 371
Spectrum, visible and near-visible, filters for the isolation of narrow regions in the, 105
Spikes, John D., Electrode reactions of isolated chloroplast fragments, 89
Spinach and iris, absence of acid phosphatase from chloroplasts of, 317
Sponsler, Olenus Lee, Obituary, 553
Sprague, V. G., Changes in the carbohydrate reserves of ladino white clover following defoliation, 467
Sprague, V. G., Reserve carbohydrates in orchard grass cut for hay, 304
Sprouting of sweetgum in relation to season of cutting and carbohydrate content, the, 35
Squash, phosphorylase and a branching enzyme in, 287
Stafford, Helen A., Phosphogluconic dehydrogenase in higher plants, 115
Starch-sucrose interconversions, V. Seasonal transformations and variations in the carbohydrates:, Studies on the chemistry of the living bark of the black locust in relation to its frost hardiness, 383
Steinberg, Robert A., Growth of tobacco seedlings with nitrate and its reduction products, 752
Steinberg, Robert A., Iron and copper enzymes in leaf lamina of tobacco when deficient in micronutrients or grown on calcareous and organic soils, 488
Steinberg, Robert A., Symptoms of molybdenum deficiency in tobacco, 319
Steinberg, Robert A., Low temperature inductions of flowering in a *Nicotiana rustica* × *N. tabacum* hybrid, 131
Sterols, some relationships of, to plant growth, 428
Steward, F. C., Investigations of nitrogen compounds and nitrogen metabolism in plants. III. Aminobutyric acid in plants with special reference to the potato tuber and a new procedure for isolating amino acids other than α-amino acids, 401
Strontium, the absorption and translocation of, by plants, 594
Studies on essentiality of micro-nutrients, the use of seeds with low content of trace elements in, 323
Studies on the chemistry of the living bark of the black locust in relation to its frost hardiness. III. The validity of plasmolysis and desiccation tests for determining the frost hardiness of bark tissue, 15
Studies on the chemistry of the living bark of the black locust tree in relation to frost hardiness. IV. Effects of ringing on translocation, protein synthesis and the development of hardiness, 177
Studies on the chemistry of the living bark of the black locust in relation to its frost hardiness. V. Seasonal transformations and variations in the carbohydrates: Starch-sucrose interconversions, 383
Studies on the chemistry of the living bark of the black locust tree in relation to frost hardiness. VI. Amylase and phosphorylase systems of the bark tissues, 629
Sublett, Thomas H., The relation of the amino acid composition to the development of oats, 77
Sucrose and urea, seasonal trends in carbohydrate and nitrogen levels and effects of girdling and spraying with, The nutritional interpretation of boll shedding in cotton, 503
Sucrose in plant extracts, the use of cation-exchange resins for the hydrolysis of, 736
Sucrose, the role of boron in the translocation of, 457
Sugars, the separation and isolation of by ion-exchange chromatography. The biosynthesis of carbon-14-labeled compounds, 731
Sullivan, J. T., Changes in the carbohydrate reserves of ladino white clover following defoliation, 467

SULLIVAN, J. T., Reserve carbohydrates in orchard grass cut for hay, 304
Sulphur treatment in the field, effect of quality and intensity of solar radiation on injury of lemon fruit by, 151
Symptoms of molybdenum deficiency in tobacco, 319
Sweetgum, the sprouting of, in relation to season of cutting and carbohydrate content, 35
Synthesis, pigment, in bean and corn, influence of visible and near infrared radiant energy on organ development and, 1

T

TABACHNICK, J., Formation of esters by yeast. II. Investigations with cellular suspensions of *Hansenula anomala*, 681
Temperature inductions, low, of flowering in a *Nicotiana rustica* × *N. tabacum* hybrid, 131
Temperature, optimum chloride concentration for malt diastase activity as a function of, 140
THOMPSON, F. J., Investigations of nitrogen compounds and nitrogen metabolism in plants. III. Aminobutyric acid in plants with special reference to the potato tuber and a new procedure for isolating amino acids other than α-amino acids, 401
Tissue culture and physiological comparisons of typical and atypical roots. III. An atypical growth of cabbage seedling roots, 415
Tissue, plant, an autoradiographic technique for detailed studies with, 143
Tobacco, effect of stable boron isotopes on growth of, in solution cultures, 127
Tobacco, iron and copper enzymes in leaf lamina of, when deficient in micronutrients or grown on calcareous and organic soils, 488
Tobacco seedlings, growth of, with nitrate and its reduction products, 752
Tobacco, symptoms of molybdenum deficiency in, 319
Tomato, comparative stimulation of parthenocarpy in the, by various indole compounds, 481
Tomato fruit, carbohydrate metabolism in the, as affected by pollination, fertilization and application of growth regulators, 255
Tomato fruit-set, Pantothenic acid and acetic acid utilization in, 748
Toxicity studies with radioactive phosphorus, aluminum, 674
Trace elements, the use of seeds with low content of, in studies on essentiality of micro-nutrients, 323
Translocation, and concentration, of nitrogen compounds in the corn plant (*Zea mays*) during grain development, 606
Translocation, and the absorption, of iron, 576
Translocation, and the absorption, of strontium by plants, 594
Translocation of minerals, across bean roots, the diurnal variation in the, 356
Translocation, protein synthesis and the development of hardiness, IV. Effects of ringing on. Studies on the chemistry of the living bark of the black locust tree in relation to frost hardiness, 177
Translocation of sucrose, the role of boron in the, 457
Transpiration studies, I. Initial growth and. The physiological action of smog on plants, 50
Trichloroacetate upon the metabolism of wheat seedlings (*Triticum vulgare*), The effect of sodium, 437
Trichlorophenoxyacetic acid, 2,4,6-; inhibition of auxin effects by, 622
Triticum vulgare—the effect of sodium trichloroacetate upon the metabolism of wheat seedlings, 437
Tritium oxide and tritium gas, absorption and metabolism of by bean plants, 717
TUKEY, H. B., The metabolism of foliar-applied urea. I. Relative rates of $C^{14}O_2$ production by certain vegetable plants treated with labeled urea, 70
Tumor-infected plants, bioelectric potentials of, 545
Turnip leaves, the intracellular distribution of ascorbic acid in, 314
TURRELL, F. M., Effect of quality and intensity of solar radiation on injury of lemon fruit by sulphur treatment in the field, 151
2,4-D stimulus in cotton, further evidence of the persistence of, 693

U

Urea, foliar-applied, the metabolism of, I. Relative rates of $C^{14}O_2$ production by certain vegetable plants treated with labeled urea, 70

Urea, seasonal trends in carbohydrate and nitrogen levels and effects of girdling and spraying with sucrose and, The nutritional interpretation of boll shedding in cotton, 503

URSPRUNG, ALFRED, Obituary, 146

Use of cation-exchange resins for the hydrolysis of sucrose in plant extracts, the, 736

Use of C^{14} in locating growth regions in the cell walls of elongating cotton fibers, the, 281

Use of seeds with low content of trace elements in studies on essentiality of micro-nutrients, the, 323

V

VENNESLAND, BIRGIT, Phosphogluconic dehydrogenase in higher plants, 115

VIRTANEN, ARTTURI I., The use of seeds with low content of trace elements in studies on essentiality of micro-nutrients, 323

VON ABRAMS, G. J., The auxin relations of a dwarf pea, 443

W

WAKSMAN, S. A., Soil Microbiology, 340

WANG, CHIH H., Conversion of C^{14}-labeled acetate to citric and malic acids in the tomato fruit, 741

Water-cooled lamp systems with refluxing aqueous filters, 334

WEBSTER, GEORGE C., Enzymatic synthesis of gamma-glutamyl-cysteine in higher plants, 728

WEBSTER, GEORGE C., Enzymatic synthesis of glutamine in higher plants, 724

WEBSTER, GEORGE C., Some respiratory characteristics of the blue-green alga, Anabaena, 63

WENGER, KARL F., The sprouting of sweetgum in relation to season of cutting and carbohydrate content, 35

Western Section, 146

Wheat seedlings, the effect of sodium trichloracetate upon the metabolism of, 437

WILSON, C. W., Studies on the chemistry of the living bark of the black locust in relation to its frost hardiness. V. Seasonal transformations and variations in the carbohydrates: starch-sucrose interconversions, 383

WILCOX, J. B., Bioelectric potentials of tumor-infected plants, 545

WITHROW, ROBERT B., Water-cooled lamp systems with refluxing aqueous filters, 334

WITHROW, ROBERT B., Filters for the isolation of narrow regions in the visible and near-visible spectrum, 105

WITHROW, R. B., Influence of visible and near infrared radiant energy on organ development and pigment synthesis in bean and corn, 1

WITTWER, S. H., Comparative stimulation of parthenocarpy in the tomato by various indole compounds, 481

WITTWER, S. H., The metabolism of foliar-applied urea. I. Relative rates of $C^{14}O_2$ production by certain vegetable plants treated with labeled urea, 70

WOOD, R. D., Responses of plants to rhenium, 755

WOODWARD, CHARLES C., The composition of plant fractions extracted with 80% alcohol, 535

WORT, D. J., The effect of 2,4-dichlorophenoxyacetic acid on phosphorylase, phosphatase, amylase, catalase, and peroxidase activity in wheat, 135

WRIGHT, K. E., Aluminum toxicity studies with radioactive phosphorus, 674

Y

Yeast, formation of esters by. II. Investigations with cellular suspensions of *Hansenula anomala*, 681

Z

Zea mays—during grain development, concentration and translocation of nitrogen compounds in the corn plant, 606

ZILL, L. R., The biosynthesis of carbon-14-labeled compounds. III. The separation and isolation of sugars by ion-exchange chromatography, 731

ZWIEG, G., Paper Chromatography (A Laboratory Manual), 147